

complex movements of arms and body give to the bat held by the two hands a complex screw motion which may approximately be described as a rotation about an oblique axis outside the bat altogether. Plate ii. of L. C. H. Palaiet's series, showing his second position, is a perfect illustration of the remarks just made; with the attitude of body and arms as given it would be impossible for the bat to have any other position without an unnatural turn of the wrists.

The effect of the true wrist-action is well described in the later part of the book. It is as effective in cricket as in golf, bringing into play a rapid acceleration just at the instant of impact. It is at the foundation of all graceful batting. As Mr. Fry well remarks, "wrist-work is the chief secret of a versatile, neat and effective style."

The book is full of a great variety of most interesting and instructive points. Those among us whose cricket is a memory will almost wish they were twenty or thirty years younger if only for the chance of testing the soundness of the teaching of Messrs. Beldam and Fry's remarkable volume; while the youthful devotee eager to improve himself in the most attractive part of our national sport will get many valuable hints from a careful perusal of its pages and study of its pictures.

C. G. K.

NOTES.

THE council of the Royal Meteorological Society has awarded the Symons gold medal to Lieut.-General Sir Richard Strachey, G.C.S.I., F.R.S., in recognition of the valuable work which he has done in connection with meteorological science. The medal will be presented at the annual general meeting of the society on January 17, 1906.

THE suggestion made by Prof. Milne in our correspondence columns this week, that an intercolonial meeting of the British Association should be held in London, is well worthy of consideration. Such a conference of representatives of science in British dominions beyond the seas and at home would strengthen the bond of union existing between them, and do something to coordinate the intellectual forces of our Empire. It is essential that men of science widely separated from one another should have opportunities of exchanging opinions upon investigations and results in which they are interested; and the advantages of such conventions are felt long after the meetings have ended. It is probable that Prof. Milne's proposal will meet with the approval of members of the association engaged in scientific work.

MEMBERS of the British Association who recently visited the Victoria Falls will be interested to learn that the small herd of hippopotami that frequents the islands above the Falls, and adds substantially to the attractions of the place, has again become troublesome. Apparently the animals have been irritated by the increasing traffic on the Zambesi; for a note in *South Africa* of November 18 states that several boats have been upset, causing one fatality and several narrow escapes. "Hippo, from any sentimental point of view," it is remarked, "are hardly the sort of things to be preserved as pets on a portion of the river where there is constant traffic, and it is to be hoped that every effort will be made to exterminate them before more serious accidents occur. . . . Those desirous of seeing the hippo in their natural haunts should find some more solitary spot where there is less danger to human life."

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THE *British Medical Journal* announces that the next meeting of the German Society of Experimental Psychology will be held at Würzburg on April 10-13, 1906. Reports will be presented on the following subjects:—(1) The relations between experimental phonetics and psychology (by E. Krueger); (2) experimental æsthetics (by O. Kuelpe); (3) the psychology of reading (by F. Schumann); and psychiatry and individual psychology (by R. Sommer).

THE account of the surveying work connected with the construction of the Simplon Tunnel, in *NATURE* of November 9 (p. 30), may be supplemented by the following final results, which have just been ascertained and are described in the *Times* of November 18 by Mr. Francis Fox. The actual measurements are as follows:—The length of the tunnel, which is $12\frac{1}{2}$ miles, proves to be greater by 31 inches. The levels of the two galleries were within $3\frac{1}{2}$ inches of one another. As regards direction, the axis of the tunnel, driven from the north end, deviated 4 1-3 inches towards the west, whilst the line driven from the south end deviated 3 2-3 inches towards the east; consequently the greatest divergence from the true line was 4 1-3 inches, which is well within the calculated probable error.

A *Times* correspondent gives in the issue of November 20 a graphic description of the means taken to stamp out yellow fever in Panama. The first cases of the disease were concealed, and it was not until a serious epidemic was in progress that President Roosevelt, on his own initiative, Congress having refused to aid him, appointed Judge Magoon to Panama as Resident Governor of the canal zone with autocratic power. The prevalence of fever was bad enough, but the demoralisation of public spirit in the American colony was worse. Governor Magoon found that, while some in utter panic were fleeing from the isthmus as a plague-spot, others had fallen into a state of cynical bravado. They professed contempt for the mosquito theory of disease dissemination, and refused to obey the preventive rules which had been formulated. They took a boastful delight in exposing themselves to mosquito bites, and tore holes in the netting which had been placed over the windows of the office buildings and hotels. The Governor soon changed all this, expressed his own fear of the disease, insisted that the evidence of the transference of the disease by mosquitoes was overwhelming, and arranged for the fumigation of every building in the city. Medical inspectors were also appointed who daily examined every inhabitant. The effect of these measures is shown by the figures of the incidence of the disease:—in May there were 38 cases; in June 62 cases; in July, after the institution of these measures, 42 cases; in August 27 cases; in September 6 cases; and since then not a single case, although a reward of 50 dollars, gold, has been offered for a notification.

MR. C. O. STEVENS, writing from Bradfield, Reading, states that on Friday last, November 17, widespread attention was attracted and curiosity aroused by sounds as of heavy-gun practice and rifle firing that made themselves felt, as well as heard, in the neighbourhood for miles around. They occurred, on and off, from about 11.30 a.m. until 4 p.m.

To the Irish Fisheries Board we are indebted for a copy of the first instalment of a list of the marine copepod crustaceans of Ireland, by Mr. J. Pearson, published as No. 3 of "Scientific Investigations" for 1904. The author states that previous students have mainly confined their investigations to the pelagic types, and that consequently

much remains to be ascertained concerning the parasitic and bottom-dwelling forms. The present section deals with littoral types and those infesting fish.

In the report of the council of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, attention is directed to the important work which has been recently accomplished in the matter of scientific publications. Unfortunately, this has somewhat crippled the society's resources, and unless additional support be accorded a pause must be made in the good work. It is estimated that the total number of visitors to the society's museum during the year will be about 17,000.

THE October issue of the *Emu* contains some beautiful photographic illustrations of the haunts and nests of the Australian lyre-bird, as well as of the bird itself. It is, however, sad to learn that, in the opinion of Mr. Kitson, the author of the accompanying notes, the lyre-bird is destined to disappear ere long from the Victorian bush unless it develops the habit of nesting in trees, as is occasionally its practice at the present time. The main persecutor is the European fox, which has been introduced with only too much success into its haunts. In South Gippsland, on the other hand, man is the criminal, and breech-loaders, forest spoliation, and bush-fires will, it is thought, before long complete their fell work, and render the lyre-bird unknown in a district where it formerly occurred in thousands. A supplement to this issue contains a useful "key" to the birds of Australia drawn up by Mr. A. C. Campbell on the "dichotomous" plan, that is to say, by according two contrasting diagnostic characters to each species.

WE regret to have to record the death of that eminent French naturalist Jean Frédéric Émile Oustalet, of whom a brief obituary notice is published in a recent issue of *La Nature*, to which journal the departed zoologist was a constant contributor. Born at Montbéliard on August 24, 1844, Oustalet passed the whole of his scientific career in the service of the Paris Museum, which he entered as an assistant in 1875. In August, 1900, he became professor of "mammalogy," with special charge of the menagerie, and co-director of the École des Hautes Études. He died "in harness" at St. Cast (Côtes du Nord) on October 26. The laureate of the Institute of France in 1877, Mr. Oustalet was secretary to the committee for ornithological investigations, and president of the Ornithological Congress in 1900. He was a Chevalier of the Legion of Honour, and had likewise received decorations from other countries. Among his more important works may be cited "*Recherches sur les Insectes fossiles*," "*Monographies des Mégapodes*," and "*Les Oiseaux de la Chine*."

THE *Journal of the Royal Sanitary Institute* for November (xxvi., No. 10) contains an address by the Duke of Northumberland on the occasion of the opening of the new hospital for infectious diseases at Newburn; Prof. Kenwood's address on the public health delivered at the opening of the medical session at University College; particulars of model cottages at Earswich, York, by Mr. Appleton; and a discussion on aspects of the pure milk question, together with notes, reviews, &c.

THE Michigan State Agricultural College Experiment Station has issued two useful Bulletins (June). No. 229 details interesting observations by Mr. Marshall on the associative action of bacteria in the souring of milk. Experiments prove that the activity of lactic acid-forming

bacteria may be much increased by admixture with another bacterium which itself does not produce lactic acid. In No. 230 Mr. Sackett describes several bacterial diseases of plants prevalent in Michigan, viz. pear blight, bacteriosis of beans, black rot of cabbage, wilt of cucumber, soft rot of sugar beet, and blight of Irish potato, tomato, and egg-plant.

IN the *Arkiv för Botanik* (vol. v., No. 3) Dr. J. Eriksson takes up the subject of the origin and spread of rust diseases in plants to combat the views of Klebahn, Marshall Ward, and others. Criticising the argument that the uredo-stage can carry infection through a severe winter, he lays stress on the want of proportion between the development in autumn and the intensity of the disease in the following summer.

As the first of a series of articles to appear in the *Indian Forester* on Indian forest fungi, Mr. E. J. Butler describes a trichosporium disease observed in Casuarina plantations; the fungus spreads through the cambium and ruptures the bark. Considerable interest attaches to the notes by Mr. F. B. Manson on the preparation and sale of rubber grown on the rubber plantation at Mergui, from which it is evident that good Para can be produced in Lower Burma.

IN a small brochure ("*Die Lichtentwicklung in den Pflanzen*") Prof. H. Molisch deals with the subject of light emission by plants. The production of light is confined to fungi, bacteria, and Peridineæ in the plant world. Prof. Molisch determined that the luminosity of meat is caused by a bacterium, and showed that the bacterium can generally be produced in a few days by partially immersing a piece of meat in brine. The emission of light from wood has been traced to the same source, and similarly decaying leaves of oak and beech may become luminous. The connection between nutrition, growth, and luminosity has been studied by Beijerinck. As to the teleological factor in the production of light, little is known except that it is an oxidation process; Prof. Molisch postulates a substance, photogen, that produces light waves in the presence of oxygen.

A SCHEME of no little interest, and worthy of generous support, has been initiated by the Midland Reafforesting Association for planting trees on the spoil banks in the black country. Anyone who has traversed the road from Wolverhampton to Dudley by way of Gornal will have realised something of the former beauty of this district. The object of the association is to prove that plantations are still feasible on the unsightly pit-mounds that cover the land. Last autumn a six-acre plot was planted at Wednesday and a small model plantation was formed at Old Hill. The extension of the work that is now in progress makes it necessary to employ a paid organising secretary. To provide funds for this purpose, and to obtain a larger balance than is at present available as working capital, Sir Oliver Lodge, the president of the association, is appealing for contributions. The honorary secretary is Mr. P. E. Martineau, Bentley Heath, Knowle, Warwickshire.

SEVERAL interesting memoirs have been issued by the Geological Survey of Queensland. One of the most valuable of these is a general index (Publication No. 197) to the various reports issued by the survey (Nos. 177 to 196), compiled by Mr. Russell Dixon. In Publication No. 196 Mr. B. Dunstan gives notes on the gold deposits near Mount Ubi, on the iron ore of Mount Lucy, on testing samples for prospectors, on monazite in Queensland, on a soil survey for Queensland, on boring for coal near Townsville, and on the testing of Queensland coals. He

also gives some mineralogical notes on agate pebbles occurring in abundance on the surface of decomposed basalt at Little River, on penetration-twin crystals of gypsum from Eukalunda, on tellurides of gold, silver, and lead (hessite and altaite) from Gympie, and on calcite crystals with pyrites inclusions from Golden Gate, Croydon. In Publication No. 198 Mr. Lionel C. Ball describes the occurrence of gold, platinum, tinstone, and monazite in the beach sands on the south coast of Queensland. The results obtained indicate that this is a favourable field for the use of a dredger. In Publication No. 199 Mr. Lionel C. Ball gives a preliminary report on the recent discovery of gold at Oaks View, near Rockhampton. The ore is a soft ferruginous material resulting from the alteration of an original serpentine. In Publication No. 200 Mr. Walter E. Cameron describes the central Queensland (Dawson-Mackenzie) Coal-measures. The coal is of permo-Carboniferous age, and a promising forecast is given of the great resources of this portion of Queensland in high-class steam-coal.

THE pretty and well known lecture experiment showing the alternations between longitudinal and torsional oscillations in a suspended spiral spring carrying a weight was described by Wilberforce in 1894. In the *Festschrift* commemorative of the seventieth birthday of Adolf Wüllner (Leipzig: B. G. Teubner, 1905) Prof. A. Sommerfeld describes some further experiments with spiral springs and discusses their use in the determination of Poisson's ratio. The following methods are distinguished:—statical observations, observations of the separate oscillation periods, construction and measurement of the Lissajou curves, determination of the conditions of resonance.

IN the *Arkiv* for mathematics, astronomy, and physics of the Swedish Academy, Mr. W. Walfrid Ekman gives an investigation (in English) on the influence of the earth's rotation on ocean currents. It had been observed by Dr. Nansen on the *Fram* that the drift produced by a given wind did not follow the wind's direction, but deviated some 20° – 40° to the right, and a mathematical investigation by the writer of the present paper showed how this deviation could be accounted for by the earth's rotation. In the present communication account is taken of the influence of continents and of neighbouring currents. The calculations show the existence of a surface current tending somewhat to follow the shore lines, but deviating 45° from the direction of the wind in the absence of boundaries, a midwater current with a velocity almost uniform and parallel to the coast, lastly a bottom current compensating for the flow of water towards or from the land in the surface current.

THE *Popular Science Monthly* for November contains a note by Prof. Mansfield Merriman on the "cattle problem" of Archimedes. This problem occurs in the form of a poem of forty-four lines in a manuscript in the library of Wolfenbüttel, and it was brought into notice by Lessing shortly after his appointment as librarian there in 1769. The problem consists, in the first place, in determining the total number of cattle grazing on the plain of Sicily, divided into white, black, dappled, and yellow bulls and cows, from seven equations of condition connecting the numbers in the eight various categories. The problem in this form is easy, but a further rider imposes the additional conditions that the number of white and black bulls shall be a square number, and the number of dappled and yellow bulls a triangular number. Amthor showed in 1880 that numbers satisfying these conditions

could be found, but instead of the total number representing a possible herd of cattle, it would consist of no less than 205,545 digits. Finally, in 1889 Mr. A. H. Bell, in conjunction with two other mathematicians, began the work of solution, and in the course of four years determined the first thirty or thirty-one and the last twelve digits of the actual numbers. It is, however, pointed out that to determine all the 206,545 digits would occupy a thousand men for a thousand years.

IN No. 2, vol. xxii., of the *Astrophysical Journal* Mr. W. W. Strong, of the Dickinson College, Carlisle (Pa.), describes the results obtained from a series of experiments on the spectrum of the magnesium spark under various conditions. The spectra were photographed with a 4-inch Rowland grating having 14,400 lines to the inch. Using magnesium poles, he found that the "principal series" lines ($\lambda\lambda$ 2802 and 2795) and the line at λ 2852 were reversed in the end-on positions, but if a copper or iron pole were substituted for one of the magnesium poles, and the remaining magnesium pole was placed away from the slit, the reversals did not occur. This seems to indicate that the reversals are caused by the surrounding vapour of magnesium, and, to prove this, the spark was made to pass between an iron and a magnesium pole through a fine hole. For holes of less than 0.5 mm. in diameter this "reversing layer" was entirely cut off, and the spectrum of the spark between the hole and the iron pole never showed any reversal. Other results, in connection with other lines, were also obtained, but an attempt to get a measurable "Doppler" effect was defeated by the diffuse nature of the lines.

THE Journal of the Meteorological Society of Japan for June last contains several useful articles, including one (in Japanese) by I. Hattori on oyster development and meteorological conditions, and notes on the climate of the Bonin Islands (in English) by T. Okada. In the summer of 1901 a station was established by the Tokio Meteorological Office at Peel Island, one of the largest of the group; the station is situated in lat. $27^{\circ} 5' N.$ and long. $142^{\circ} 11' E.$ In addition to the automatic records, observations have been regularly made at 10h. a.m. and 2h. p.m., and the results are published for the years 1902–4. The principal facts relating to this isolated Pacific station may be interesting to some of our readers. The mean annual temperature is $71^{\circ}.8$, the mean monthly maximum being $79^{\circ}.5$, in August, and the minimum $61^{\circ}.5$, in January; the highest temperature recorded was $91^{\circ}.4$, in September, and the lowest $45^{\circ}.5$, in February; no frost or snowfall has been recorded, and vegetation is astonishingly luxuriant. North-westerly winds blow almost constantly from December to February, inclusive; the easterly monsoon prevails from July to October, inclusive. The rainy seasons are June and September, and the driest months are April and January; the total annual rainfall is about 54 inches, and, on an average, there are 147 rainy days in a year. The mean annual relative humidity is 75 per cent.

IN the October number of the *Journal de Physique* M. H. Buisson gives particulars of a new determination of the mass of a cubic decimetre of pure water. The author criticises the usual method of determining the volume of a solid by measurement of the linear dimensions; in his experiments two parallelepipeds of quartz, almost cubes, of four and five centimetres edge were used, their densities, and hence their volumes, being determined by the hydrostatic method, after correcting all the data to $0^{\circ} C.$ The geometrical dimensions of the cubes were then ascertained by two distinct optical methods based on the

principle of interference. By a comparison of the two sets of values, the ratio of the litre to the cubic decimetre was found in two determinations to be 1.000026 and 1.000029 respectively. The error on the kilogram is thus +26 to +29 milligrams.

MESSRS. SWAN SONNENSCHN AND CO., LTD., have published a third edition of "Sanatoria for Consumptives," by Dr. F. Rufenacht Walters. The book, the first edition of which was reviewed in NATURE for July 6, 1899 (vol. lx. p. 221), gives a critical and detailed description, together with an exposition, of the open-air or hygienic treatment of phthisis.

DR. H. C. VOGEL, director of the Astrophysical Observatory at Potsdam, has edited the third edition of Newcomb-Engelmann's "Populäre Astronomie," published by Mr. W. Engelmann, Leipzig. Many additions have been made, both to the text and illustrations, particularly in the sections devoted to spectrum analysis, photometry, photography, and other branches of astrophysics; and the whole work has been satisfactorily revised. Short biographies of deceased astronomers from Thales to Keeler, arranged according to their years of birth, are given near the end of the volume.

We have received from Mr. H. K. Lewis, 136 Gower Street, W.C., a copy of No. 23 of his *Quarterly List* of additions to the circulating library. The list contains more than 100 titles, and includes several important new books and new editions on the various subjects covered by the library. There are brief notes to most of the books which, while not pretending to give the subscriber an exact idea of the book, enable an opinion to be formed on its general scope. On looking through the books included we notice that, since the first number appeared, considerable extension in the scope of the library has taken place. The library has been long known as a useful medium for the supply of medical literature, and the inclusion of all branches of technological and general scientific books, commenced some two or three years ago, should add to its value.

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A COMET, 1905b.—A telegram from the Kiel Centralstelle announces the discovery of a comet by M. Schaer at Geneva on November 17. At 8h. 7.8m. (M.T. Geneva) the position of the comet was

R.A. = 4h. 22m. 32s., dec. = +86°.

The apparent daily movement of this object is given as -54° in R.A. (i.e. 3h. 36m.) and -1° in declination.

A second telegram from the same source announces that the comet was observed at Bamberg on November 18.075. The position, at 6h. 50.6m. (Bamberg M.T.), was

R.A. = 0h. 58m. 19.5s., dec. = +80° 40' 5".

It thus appears that this object was first seen near to Polaris, and is now travelling quickly down through Cepheus towards Cassiopeia.

NOVA AQUILÆ No. 2.—The results of a number of observations of Nova Aquilæ are recorded in No. 4052 of the *Astronomische Nachrichten*.

On September 29 Prof. Wolf recorded the magnitude of the Nova as 9.6-9.7, which indicated scarcely any decrease in the brightness since September 17.

A photograph, taken on October 16 with fifty-six minutes' exposure, showed, however, that the Nova's magnitude had decreased to 10.8, that is to say, it had fallen about 1.2 magnitudes in seventeen days. On this photograph the image of the Nova is surrounded by a faint uneven halo 1' or 2' in diameter.

THE TENTH SATELLITE OF SATURN.—No. 9, vol. liii., of the Harvard College Observatory Annals contains an account, by Prof. W. H. Pickering, of the discovery of Saturn's tenth satellite, to which the name Themis has been allotted.

So far no variation of the satellite's brightness has been detected, its magnitude remaining constant at about 17.5. As this magnitude is beyond the power of existing telescopes, the satellite can never be observed *visually* until more powerful instruments are available. The probable diameter of Themis is about 38 miles; the orbit of the satellite is inclined about $39^{\circ}.1$ to the ecliptic, and its eccentricity and semi-major axis are about 0.23 and 906,000 miles respectively. The period of revolution is 20.85 days. As the observational data are, as yet, so few, all the above values are to be considered as only approximate. A drawing accompanying the description represents the orbit diagrammatically.

Owing to its great eccentricity, the orbit of Themis crosses the orbits of both Hyperion and Titan, and, when near to these bodies, the newly discovered satellite must suffer enormous perturbations, the results of which are discussed in Prof. Pickering's paper.

THE EVOLUTION OF THE SOLAR SYSTEM.—Another alternative to Laplace's theory of the formation of planetary systems is suggested in an article by Mr. F. R. Moulton, of Chicago University, in the *Astrophysical Journal* for October. In 1900 this writer and Prof. T. C. Chamberlin examined the older hypothesis from the dynamical standpoint, and found so many conclusive contradictions as to lead them to abandon it.

The theory now suggested supposes that the planets and their satellites have been formed around primitive nuclei of considerable dimensions existing in a spiral nebula probably similar to those which Prof. Keeler showed to be many times more numerous than all the nebulae of other types.

The growth of each nucleus was caused by the gradual accretion of smaller masses, and the method of this growth which is suggested accounts for all the different types of bodies now found in the solar system, and for their present motions and velocities, on dynamical principles.

The original spiral nebula is supposed to have been formed by the near approach of another star to the body which is now our sun. This exterior attraction set up tides in the solar matter, and, being continued, actually caused immense masses to be ejected and drawn out into the spiral form. On this assumption the spiral would emerge from the central nucleus in two directions, on opposite sides, and this is the form generally shown on photographs of such nebulae.

Mr. Moulton's paper considers at length the explanation, on this hypothesis, of the existing conditions, and a fuller exposition of the theory is promised in a new work which is to be published shortly.

CATALOGUE OF VARIABLE STARS.—No. 7, vol. liii., of the Harvard College Observatory Annals contains a second supplement to the provisional catalogue of variable stars which was issued in a previous volume of the Annals. The original intention of the Harvard authorities was to publish a supplement, similar to the one issued in 1903, every five years, but the large number of variables recently discovered renders a change of plan necessary. More than 400 variables are included in the present supplement, many of them belonging to the nebulous regions investigated by Miss Leavitt.

During 1904 the number of variable stars was increased by 503, of which 431 were discovered photographically at Harvard. The card-catalogue of variables which is being compiled at Harvard now comprises about thirty-five thousand cards.

STAR CALENDAR FOR 1906.—We have received a copy of a very useful star calendar compiled by [H.P.H.], and published by Messrs. Hirschfeld Bros. The calendar consists of four cards designed to hang on the wall for ready reference. Each card contains the ordinary date-calendar for the quarter, a table showing the positions of the planets in regard to the constellations, and a star map so marked that the constellations and stars which may be observed on any evening during the quarter, may be instantly recognised by their relative positions in regard to the cardinal points and to the zenith. The price of the calendar is 1s. net.